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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/754,803	01/09/2004	Sung-Eun Park	678-1329	1594

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EXAMINER	
GRAY, CHRISTOPHER B	
ART UNIT	**PAPER NUMBER**
2609	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/754,803	PARK ET AL.	
	Examiner	Art Unit	
	Christopher Gray	2609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☒ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. **Claims 14, 20, 22 and 27** are rejected under 35 U.S.C. 102(e) as being anticipated by Khandani et al (US 2004/0093545 A1). Khandani teaches, with reference to Figure 13, a generated Fast Fourier Transform sequence, FFT, from transforming a received data sequence, where the FFT sequence is masked, checked for errors, and selecting which mask sequence compares to the sequence selected by the transmitter. Khandani states, "The decoder receives a received signal 148 which passes to de-multiplexer 150, Fast Fourier Transform (FFT) block 152, multiplexer 154, a QAM demapping block 156, a de-interleaver 158, and a decoder 160. It can be seen that all of these blocks are simply the inverse blocks of those in the transmit processing path of FIG. 12"([0168]) and further states, "The decoded sequence produced by decoder 160 is then passed through the CRC checker 162 which computes a CRC output. In a receiver for a conventional system, such as that shown in FIG. 11, the receiver would perform de-scrambling between the QAM demapper and the de-

interleaver, and then the CRC checker would compute a CRC output which would either be correct (i.e. all zeros) or incorrect (i.e. non-zero).... the CRC checker 162 will be a function of which scrambling sequence was used at the transmitter.... These N different CRC outputs are referred to as syndromes of the CRC output. There is a one-to-one mapping between the syndrome of the CRC, and the scrambling sequence used at the transmitter. Thus, at the receiver the CRC output 162 is compared to the N syndromes indicated at 164A through 164N. The matching syndrome is then mapped to the corresponding sequence that was used at the transmitter"([0170]), which anticipates the claimed limitations of a FFT transform, masking the FFT transform result, a CRC check, and detecting a mask sequence selected from the transmitter.

3. **Regarding claims 15 and 23**, Khandani further teaches symbol demapping of the FFT sequence and channel decoding of the information sequence in Figures 13 and 15, which anticipates the instant invention's limitations of symbol demapping and channel decoding.

4. **Regarding claims 16 and 24**, Khandani teaches in Figure 13, a FFT sequence being masked by an exclusive-or operator (168) with a sequence (166N), which anticipates the instant invention's limitation that a FFT sequence is being masked with mask sequences controlled by an exclusive-or operator ([0167]-[0175]).

5. **Regarding claims 18 and 26**, Khandani teaches in Figure 13, a FFT sequence being masked by being multiplied with a sequence, which anticipates the instant invention's limitation that a FFT sequence is being multiplied with mask sequences controlled by an exclusive-or operator.

6. **Regarding claim 19**, Khandani further teaches, "At step 415-3, the output determined in step 415-2 compared to the set of valid syndromes and if there is a match, it is mapped to the sequence index k. if there is no match (steps 414-5) then an error has occurred"([0176]), which anticipates the instant invention's limitation of the sequence being error-free.

7. **Regarding claims 21 and 29**, Khandani teaches, "A code book matching the syndrome to the various scrambling sequences is used at the received side"([0172]), which anticipates the instant invention's limitation of a sequence being compared to the previous sequences due to a CRC check.

8. **Regarding claim 28**, Khandani teaches that the generated sequences are formed by creating masks. Khandani further states on the receiving end the sequences, containing the masks, are the same as the sequences sent from the transmitter, which anticipates the masks being generated. In figure 13, Khandani teaches the decoded data being added to the sequences containing masks by XOR operator, which

anticipates the instant invention's limitation of the mask sequence being added to the decode information sequence.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 1-3, 5-9, 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khandani et al (US 2004/0093545 A1) in view of Kim et al (US 2002/0172184 A1).

Regarding claims 1 and 7, Khandani teaches, with reference to Figure 12, shows a CRC bits being added to data which makes data (information) sequence ([0165]). Khandani also teaches the data being masked when it states, "A set of sequences can be generated by combining a number of base masks. For example, with

four base masks, 16 different scrambling sequences can be generated using all linear combinations of the four base masks. Thus, four mask generators together with logic to generate the 16 combinations may be used. More generally, a scrambling sequence needs to be provided for each path and this can be generated in any suitable manner"([0166]), which refers to the instant invention's limitation of having masked data. Khandani further teaches the masked data going through an Inverse Fast Fourier Transform (IFFT) outputting IFFT sequences (Figure 13, ([0167]-[0168]), which refers to the instant invention's claim of the masked data going through an Inverse Fourier Transform. Khandani teaches all the limitations except for the IFFT sequence having the lowest Peak to Average Power Ratio, PAPR, will be selected; however, Kim, which is in the same field of endeavor, teaches, "…. the OFDM system scrambles each OFDM symbol data block with different scrambling codes, subjects the scrambled signals to IFFT, and selects a sequence having minimum PAPR from the IFFT-transformed signals"([0057]), which refers to the instant invention's limitation of the sequence having the lowest PAPR will be selected. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include CRC bits being added to a data stream, masking that combined data stream, performing an Inverse Fourier Transform of the data and selecting the stream with the lowest PAPR, to improve transmission error performance.

Regarding claims 2 and 8, Khandani further teaches, referring to Figures 5, constellation shaping units, which refers to the instant invention's limitation of the

masked information undergoes symbol mapping. With reference to Figure 12, Khandani teaches channel encoding for the masked data with channel encoders 112A-112N.

Regarding claims 3 and 9, Khandani further teaches, using a XOR, exclusive-or gate, to control the information sequence with the mask sequences. Khandani states, "To calculate the minimum weight of codeword with mask, only some slight changes need to be made in the minimum weight calculation algorithm presented before. The changes correspond to re-labeling the branches of the trellis by XORING their original binary label with the corresponding bit in the mask under consideration. The algorithm for finding the minimum distance is applied to the modified trellis diagram corresponding to XORING each mask with the original trellis. In the case of several masks, the overall minimum distance is equal to the smallest hamming weight computed over all possible masks"([0191]), which refers to then instant invention's limitation of XOR gate controlling the data sequence being combined with the mask sequence.

Regarding claims 5 and 11, Khandani further teaches, in Figure 12, the mapped information, with the CRC bits, being multiplied with mask sequences and states, "Thus the first processing path has adder 130A and sequence one generator 132A, and the adder is connected to receive the signal after the addition of the CRC by block 110, and prior to encoding in encoder 112A. The same is true for each of the other processing paths"([0165]), which refers to the instant invention's limitation of information data and the masked data being multiplied together.

Regarding claim 12, Khandani further teaches a mask generator when it is stated, " A set of sequences can be generated by combining a number of base masks. For example, with four base masks, 16 different scrambling sequences can be generated using all linear combinations of the four base masks. Thus, four mask generators together with logic to generate the 16 combinations may be used"([0166]), which refers to the mask generator of the instant invention.

Regarding claims 6 and 13, Kim further teaches, ".... the OFDM system scrambles each OFDM symbol data block with different scrambling codes, subjects the scrambled signals to IFFT, and selects a sequence having minimum PAPR from the IFFT-transformed signals"([0057]), which refers to the instant invention's limitation of the PAPRs of the IFFT sequences and selecting the sequence which has the lowest PAPR.

12. **Claims 4 and 10** rejected under 35 U.S.C. 103(a) as being unpatentable over Khandani et al (US 2004/0093545 A1) in view of Kim et al (US 2002/0172184 A1), as applied to claim1 above, and further in view of Teo et al (US 6,996,418 B2). The references, as applied above, teach all the limitations except for the information sequence being channel encoded or symbol mapped; however, Teo, which is in the same field of endeavor, teaches, with reference to Figures 2A and 2B, data information going through a FEC encoder unit and modulation mapping unit, where the FEC encoder refers to the instant invention's limitation of the information sequence having

channel encoding performed, and the modulation mapping unit refers to the instant invention's limitation of the information sequence having symbol mapping performed. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the information sequence being mapped and encoded to provide safe transmission for data and reduce the lost bits contained the data.

13. **Claims 17 and 25** are rejected under 35 U.S.C. 103(a) as being unpatentable over Khandani et al (US 2004/0093545 A1) as applied to claim 14 above, and further in view of Ma et al (US 7,042,858 B1). Khandani, as applied above, teaches masking steps but does not teach the limitations of symbol de-mapping and channel decoding after the masking steps; however, Ma, which is in the same field of endeavor, teaches symbol de-mapping and channel decoding in Figure 5, which refers to the instant inventions limitation of symbol de-mapping and channel decoding. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the symbol de-mapping and channel decoding taught by Ma and combine them with the masking steps provided by Khandani to reduce errors in a communication system while maintaining the peak-to-average power ratio to a minimum.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Gray whose telephone number is (571)-

270-1823. The examiner can normally be reached on Monday-Friday 7:30am - 5:00pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Garber can be reached on (571)-570-1202. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CBG